

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT (SCAQMD)

SCAQMD 1113 (2004) Source Specific Standards and VOC Limits to Reduce Air Quality Impacts for Architectural Coatings

UNDERWRITERS LABORATORIES (UL)

UL 1236 (2006; R 2009; R 2010) Standard for Battery Chargers for Charging Engine-Starter Batteries

U.S. GREEN BUILDING COUNCIL (USGBC)

LEED (2009) Leadership in Energy and Environmental Design (tm) Green Building Rating System for New Construction (LEED-NC)

1.2 LEED COMPLIANCE

This project has been designed to be compliant with LEED® Building Design and Construction, Version 2009. The design requirements stated herein, refer to the requirements found in Section 01 33 29 LEED(TM) DOCUMENTATION for Green Building Design & Construction, Version 2009 Reference Guide. The project shall comply with SCAQMD 1113, GC-03, and GS-11. Coatings shall

Add:
and selective
catalytic reduction
system completely
assembled,
prewired, and piped
on a common base.

1.3 SYSTEM DESCRIPTION

a. Provide and install each engine-generator set complete and totally functional, with all necessary ancillary equipment to include: air filtration; starting system; generator controls, protection, and isolation; instrumentation; lubrication; fuel system; cooling system; ~~and engine exhaust system~~. Each engine-generator set shall satisfy the requirements specified in the Engine-Generator Parameter Schedule.

b. Each set shall consist of one generator, and one exciter mounted, assembled on one base; and other necessary ancillary equipment shall be mounted separately. Sets having a capacity of less than 750 kW capacity may be shipped in sections. The equipment shall be environmentally suitable for the local climate. All equipment shall be the manufacturer's standard product offered for commercial or industrial use. Any nonstandard products or components and the reason for their use shall be specifically identified in paragraph SUBMITTALS.

Add:
c. All engine
generator sets shall
be of the same
manufacturer and
model.

1.3.1 Engine-Generator Parameter Schedule

ENGINE-GENERATOR PARAMETER SCHEDULE

Power Rating	2500 kW Prime
Overload Capacity (Prime applications only)	110 percent of Service Load for 1 hour in 12 consecutive hours
Service Load	3125 kVA (maximum)

ENGINE-GENERATOR PARAMETER SCHEDULE

*Max Time to Start and be Ready to Assume Load	10 seconds
Max Summer Indoor Temp (Prior to Genset Operation)	10 degrees above ambient
*Min Winter Indoor Temp (Prior to Genset Operation)	55 degrees
Max Allowable Heat To Engine Generator Output Capacity	1.57 MBTU/hr
Max Summer Outdoor Temp (Ambient)	+100 degrees F
Min Winter Outdoor Temp (Ambient)	-30 degrees F
Installation Elevation	5,663 above sea level

Add:
Engine Generator
Emissions Rating
Tier 2 (Tier 4i after
SCR)

*Note: Manufacturer to provide heaters if needed to obtain requirement.

1.3.2 Rated Output Capacity

Each engine-generator-set shall provide power equal to the sum of Service Load plus the machine's efficiency loss and associated ancillary equipment loads. Rated output capacity shall also consider engine and/or generator oversizing required to meet requirements in paragraph Engine-Generator Parameter Schedule.

1.3.3 Power Ratings

Power ratings shall be in accordance with EGSA 101P.

1.3.4 Transient Response

The engine-generator set governor and voltage regulator shall cause the engine-generator set to respond to the maximum step load changes such that output voltage and frequency recover to and stabilize within the operational bandwidth within the transient recovery time. The engine-generator set shall respond to maximum step load changes such that the maximum voltage and frequency deviations from bandwidth are not exceeded.

1.3.5 Reliability and Durability

Each prime engine-generator set shall have both an engine and a generator capable of delivering the specified power on a prime basis with an anticipated mean time between overhauls of not less than 10,000 hours operating with a 70 percent load factor. Two like engines and two like generators shall be cited that have performed satisfactorily in a stationary power plant, independent from the physical location of the manufacturer's and assembler's facilities. The engine and generators should have been in operation for a minimum of 8000 actual hours at a minimum load of 70 percent of the rated output capacity. During two consecutive years of service, the units should not have experienced any

Drawings which accurately depict the as-built configuration of the installation, upon acceptance of the diesel-generator set installation. Revise layout drawings to reflect the as-built conditions and submit them with the as-built drawings.

SD-03 Product Data

Harmonic Requirements; G, AE
Engine-Generator Parameter Schedule; G, AE

Description of the generator features which mitigate the effects of the non-linear loads listed.

Heat Exchanger; G, AE

Manufacturers data to quantify heat rejected to the space with the engine generator set at 110 percent of generator set loading. Data shall address heat loss of generator, generator engine radiated energy, and generator exhaust system radiated energy and heat loss required through the engine coolant via the heat exchanger.

Generator; G, AE

Complete manufacturer's data including impedances, transient constants, and short circuit showing generator kVA output leading and lagging power factor base values for per unit data

Manufacturer's Catalog; G, AE

Manufacturer's standard catalog data describing and depicting each engine-generator set and all ancillary equipment in sufficient detail to demonstrate complete specification compliance.

Site Welding; G, RO

A copy of qualifying procedures and a list of names and identification symbols of qualified welders and welding operators. A letter listing the welder qualifying procedures for each welder, complete with supporting data such as test procedures used, what was tested to, and a list of the names of all welders and their identification symbols.

Spare Parts

List of spare parts, as specified.

Onsite Training; G, RO

A letter giving the date proposed for conducting the onsite training course, the agenda of instruction, a description of the video recording service to be provided, and the kind and quality of the recording to be left with the Contracting Officer at the end of the instructional period.

Add:

SCR and all ancillary equipment in sufficient detail to demonstrate complete specification compliance.


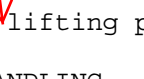
The following items shall also be submitted: SCR unit manufacturer and model and urea solution flow rates at 100%.

This information shall be submitted within three weeks of contract award.

engineer shall have attended the engine generator manufacturer's training courses on installation and operation and maintenance of engine generator sets. The field engineer shall be available throughout commissioning and start up of the Power plant within a 48 hour notice.

1.5.7 Detailed Drawings

Submit detailed drawings showing the following:

- a. Base-mounted equipment, complete with base and attachments, including anchor bolt template and recommended clearances for maintenance and operation.
- b. Complete starting system.
- c. Complete fuel system.
- d. Complete cooling system.
- e. ~~Complete exhaust system.~~
- f. Layout of relays, breakers, programmable controllers, switchgear, batteries, baattery chargers, and switches including applicable single line and wiring diagrams with written description of sequence of operation and the instrumentation provided.
- g. The complete lubrication system, including piping, pumps, strainers, filters, hot start system, controls, and wiring.
- h. Location, type, and description of vibration isolation devices for all applications.
- i. The safety system, together with a detailed description of how it is to work. Wiring schematics, safety devices with a listing of their normal ranges, alarm and shutdown values (to include operation parameters such as pressures, temperatures, voltages, currents, and speeds) shall be included.
- j. Schematic and wiring  of the generator, exciter, regulator, engine control module, and instrumentation.
- k. Three-line ac elementary diagram of the generator, exciter, current and voltage transformers, and voltage regulator.
- l. Mounting and support for each panel and major piece of electrical equipment.
- m. Engine-generator set  lifting points and rigging instructions.

Replace with:
Complete exhaust
and SCR system.

Insert:
and SCR

Insert:
and SCR

1.6 DELIVERY, STORAGE, AND HANDLING

Properly protect material and equipment, in accordance with the manufacturers recommended storage procedures, before, during, and after installation. Protect stored items from the weather and contamination. During installation, piping and similar openings shall be capped to keep out dirt and other foreign matter.

1.7 EXTRA MATERIALS

Submit a complete list of spare parts for each piece of equipment and a complete list of all material and supplies needed for continued operation. Lists shall include supply source and current prices. Separate each list into two parts, those elements recommended by the manufacturer to be replaced after 3 years of service, and the remaining elements.

PART 2 PRODUCTS

2.1 NAMEPLATES

Each major component of this specification shall have the manufacturer's name, style, model or serial number and rating on a plate secured to the component. As a minimum, nameplates shall be provided for:

Add:
SCR Components



Engines	Relays
Generators	Transformers (CT & PT)
Voltage regulators	Engine monitoring and control panel
Exciter	Engine control modules
Pumps and pump motors	Exhaust System (EPOD)
Heat exchangers	Dosing cabinet

Where the following equipment is not provided as a standard component by the diesel engine generator set manufacturer, the nameplate information may be provided in the maintenance manual in lieu of nameplates.

- Air compressor
- Battery charger
- Heaters
- Battery
- Duplex DEF pump station

2.2 SAFETY DEVICES

Exposed moving parts, parts that produce high operating temperatures, parts which may be electrically energized, and parts that may be a hazard to operating personnel shall be insulated, fully enclosed, guarded, or fitted with other types of safety devices. The safety devices shall be installed so that proper operation of the equipment is not impaired.

2.3 MATERIALS AND EQUIPMENT

2.3.1 Filter Elements

Fuel-oil, lubricating-oil, DEF, and combustion-air filter elements shall be manufacturer's standard. Provide dual filters so filters can be replaced without engine shutdown.

2.3.2 Instrument Transformers

NEMA C12.11.

2.3.3 Revenue Metering

IEEE C57.13.

e. One disconnect switch shall be provided to isolate the grounding resistor from the generator neutral. The disconnect switch shall be operable from the front of the switch enclosure and readily accessible for terminating the incoming cable in the terminal compartment.

f. Manufacturer shall conduct neutral grounding resistor routine tests in accordance with IEEE 32 and submit a written report containing the results.T

2.9 AIR INTAKE EQUIPMENT

Filters and silencers shall be provided at the turbo charger and shall be convenient for servicing. The silencer shall be of the high-frequency filter type, located in the air intake system as recommended by the engine manufacturer. Silencer shall be capable of reducing the noise level at the air intake so that the indicated pressure levels specified will not be exceeded. A combined filter-silencer unit meeting requirements for the separate filter and silencer items may be provided..

2.10 EXHAUST SYSTEM

The system shall be separate and complete for each engine. Piping shall be supported to minimize vibration. Where a V-type engine is provided, a V-type connector, with necessary flexible sections and hardware, shall connect the engine exhaust outlets.

2.10.1 Flexible Sections and Expansion Joints

A flexible section shall be provided at each engine. Flexible sections shall have flanged connections. Flexible sections shall be made of convoluted seamless tube without joints or packing. Expansion joints shall be the bellows type. Expansion and flexible elements shall be stainless steel suitable for diesel-engine exhaust gas at the maximum exhaust temperature that is specified by the engine manufacturer. Expansion and flexible elements shall be capable of absorbing vibration from the engine and compensation for thermal expansion and contraction.

2.10.2 Exhaust Section

The exhaust system shall use an un-
housing. The housing shall be
set on isolators at the floor.
double-wall critical grade sile
walls. Unit contains compact m
diesel particulate filters (oxi
electronic controller and inject
separate mounting from body.

Exhaust temperature 900 degrees

Add:
The final emissions
from the Diesel
Generator after the
SCR system shall
meet the Tier 4i
requirements as set
by the EPA.

the exhaust/silencer
above the generators and
be a 304 stainless steel
insulation between the
for NOx reduction, and
With closed loop
ed in one module for

H₂O.

~~Tier 4 Final Levels:~~

NO_x	0.50 g/bph	hr
CO	2.60 g/bph	hr
HC	0.14 g/bph	hr
PM	0.02 g/bph	hr

Provide with air compressor for injection of urea.

2.10.3 Pump Station

Provide with duplex DEF (diesel engine fluid) pump station for supply from totes to dosing cabinet.

- a. Contrifugal pump specifically designed and engineered for pumping DEF.
- b. Pump to be self-priming, stainless steel, with built-in thermal and current overload protection.
- c. Motor and terminal box NEMA 4.
- d. Nozzle-venturic diffuser assembly, and impeller technopolymer A, shaft, roter, and seal cover stainless steel, carbon ceramic mechanical seal, with viton gasket.
- e. Basis of design Benecor.

2.10.4 Exhaust Piping

Horizontal sections of exhaust piping shall be sloped downward away from the engine to a drip leg for collection of condensate with drain valve and cap. Changes in direction shall be long radius or as indicated. Exhaust piping, mufflers and silencers installed inside any building shall be insulated in accordance with paragraph THERMAL INSULATION and covered to protect personnel. Vertical exhaust piping shall be provided with a hinged, gravity-operated, self-closing, rain cover.

2.11 PYROMETER

A pyrometer, multi-point selector switch, and individual thermocouples with calibrated leads shall be provided to show the temperature in each engine cylinder and the combined exhaust. For a supercharged engine, additional points, thermocouples and leads shall be provided to show the temperature in the turbocharger exhaust gas outlet and passages. Graduated scale length shall be 12 inches. The selector switch shall be double pole, with one set of points for each thermocouple, and suitable for the pyrometer, thermocouples, leads and compensating device. The pyrometer, graduated to show true exhaust temperature within plus or minus 10 degrees Fahrenheit of the highest temperature encountered at 110 percent load.

Add:
for compliance with
the limits of
emissions, to EPA
Tier 4i emissions
requirements.

2.12 EMISSIONS

The finished installation shall comply with Federal, state, and local regulations and restrictions ~~regarding the limits of emissions, as listed in Paragraph Exhaust Section.~~

2.13 STARTING SYSTEM

The starting system for standby engine generator sets used in emergency applications shall be in accordance with NFPA 110 and as follows.

2.13.1 Controls

An engine control switch shall be provided at the EMCP with functions including: run/start(manual), off/reset, and automatic mode. Start-stop

remote input/output unit which will be connected to the PLC using a data highway connection.

2.18 BASE

The base shall be constructed of steel. The base shall be designed to rigidly support the engine-generator set, ensure permanent alignment of rotating parts, be arranged to provide lube-oil, and ensure that alignment is maintained during normal operation. The base shall be designed for installation and shall withstand vibration of the engine and generator. Provide suitable holes for mounting on vibration isolators.

2.19 THERMAL INSULATION

Thermal insulation shall be as specified in the following table:
INSULATION FOR MECHANICAL SYSTEMS

2.20 PAINTING AND FINISHING

The engine-generator set shall be painted with the manufacturer's standard color. The paint shall comply with SCAQMD 1113, GC-03, and shall be applied in accordance with the manufacturer's instructions.

2.21 FACTORY INSPECTION AND TESTS

Perform the factory tests on each engine-generator set prior to shipment. The engine-generator set shall be run at full capacity prior to inspections. If necessary repairs made, prior to the final inspection, the necessary protective devices that are provided as part of the standard package shall be installed. If controls and switchgear are not provided as part of the manufacturer's standard package, the necessary protective devices provided for the project are not to be installed. The Contracting Officer may witness inspections and tests.

2.21.1 Factory Inspection

Inspections shall be performed prior to the testing of the assembled engine-generator set. Inspections shall include leaks, looseness, defects in components, and any other defects found to be in need of correction. The following checklist shall be used:

INSPECTION ITEM

1. Drive belts
2. Governor and adjustments
3. Engine timing mark
4. Starting motor
5. Starting aids
6. Coolant type and concentration
7. Radiator drains
8. Block coolant drains
9. Coolant fill level

Add:

2.17.5 MONITORING, RECORDING, AND REPORTING

The Generator and Selective Catalytic Reduction (SCR) system controllers will be connected to the Mountainview SCADA system through Modbus/TCP protocol for monitoring, recording, and reporting. The information collected from the controllers will be used for real time monitoring, recorded and stored in a static and historical data base located in the Mountainview historian server to be used to generate automated run time and historical reports. Reports shall contain the sample time and date when the sample was taken, and the report printing time and date.

The data to be monitored and recorded during generator startup and shutdown are as follows:

- Engine Load
- Engine Status
- Urea Flow
- Compressed Air Pressure
- Post-Catalyst Temperature
- Pre-Catalyst Temperature
- Post-Catalyst Pressure
- Pre-Catalyst Pressure
- SCR System Alarms

Automated run time reports consist of the following:

- Unique sequential engine run identifying number
- Date and time stamp of engine run time
- Engine name/number
- Time stamp of urea injection time
- End time of engine run
- Total run time
- Time to reach SCR process temperature
- Total kWh produced during engine run
- Total urea injected
- List of all Alarms generated during engine run